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WINDOW GLASS AS A FACTOR IN HUMAN EVOLUTION

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THREE years ago in a brief private publication, I mentioned the importance of window glass as a potential factor in the present and future evolution of the race. Since that time the subject has impressed me with increasing force. I wish to express my thanks to Professors J. H. Robinson, of Columbia, and A. M. Hyde, of Washburn, for valuable references throwing some light on the time when window glass came into general use. The more one hunts for such references the more one is impressed with two facts, namely, that very little has been recorded as to the time when window glass was commonly used, and that it was a surprisingly recent event, only a matter of some two centuries ago.

That window glass is a factor of prime importance in the evolution of man has not been sufficiently elucidated. Not that glass has had much to do with shaping his body and brain of to-day—it has not had time to do that—but that the thoughts filling his mind, that the greater part of his activities, and that the bodies and brains of generations to come are and will be greatly influenced by window glass; and that in it are serious dangers as well as boons. The thought is astonishing, yet simple of proof, and clear as the light which comes through the windows in question.

Before window glass became a common possession of the people there came into homes and shops the air and the temperature of outdoors through the openings which admitted the light of day. The air was beneficial but the temperature it brought with it not always so. When the outdoor temperature was not too low and the outdoor air not in too great activity, life and industries within could go merrily and well, but let either the air or its temperature be unfavorable and at once discomfort and a necessary cessation of certain activities ensued.

Think of the demoralizing effect of such uncertainty upon industry. Modern inventions could not have come in such marvellous profusion before the day of this one invention of a simple device admitting daylight and excluding to a great extent, the outer temperature.

Many other inventions should do homage to this one to which they unwittingly owe their existence. Even to-day if window glass should become one of the "lost arts," a large number of other inventions would at once cease to be useful or be forgotten through neglect, even despite the fact that artificial illumination has made remarkable strides since the universal introduction of window glass. When we boast that so many changes have taken place in our industrial life so very recently, and that our so-called "civilization" has had a mushroom-like growth, let us note that the chain of links of causes leads us quickly back to window glass as one of the prime permitters.

But, some one may object, was not glass manufactured and distributed by the ancient Phœnicians? Yes and probably before these by the Egyptians. How then can we attribute our very recent and radical changes to window glass? It is indeed surprising to think how new is the general use of glass in windows when the substance had been known so long and used for vases and gems and, now and then, in some sort of window. We read of ancient windows of perforated marble frames set with small plates of cast glass. There were the marvellous stained glass windows of medieval cathedrals. Back as far as the time of Pope Leo III. (795-816 A.D.) and probably earlier, colored glass was used for church windows. The common people, however, had no such luxury in their homes and shops. That which we now consider a necessity, was unknown to our forebears for many centuries thereafter. Recent terrific explosions in New Jersey, breaking windows in many hundreds of homes and other buildings, brought home to some for a few days our real dependence upon window glass to-day.

By 1302 the king of France used some window glass made in his own country at Bezu le Foret, Department of the Eure. Eneas Silvio, who later became Pope Pius II., expresses his surprise at finding glazed windows in Vienna in 1448. These were probably composed of those strange round panes that are sometimes imitated in modern windows.

Whatever window glass existed in Roman times was cast. The art of casting glass seems then to have been forgotten until 1688, after which it became possible to make much larger mirrors than could be made by blowing. Yet window glass was even then the prized possession of kings and wealthy nobility, and these had only a scant supply.

A writer in the time of Elizabeth speaks of glass windows displacing lattice-work, but so rare and costly was it at that time that some noble when he left his city residence had the

glass windows carefully removed. A century later, in the time of Charles II., glass was not used in all of the rooms of the king's palace. It was therefore not before the eighteenth century that glass became at all common in the windows of the people. The writer would welcome facts throwing positive light upon the precise times when in various localities window glass became really common and cheap enough for all people to have all they wanted of it. In the light of such literature as I have looked into up to the present time it seems safe to assume that while many individuals may have had scant supplies of window glass by the middle of the seventeenth century or earlier, the commodity could hardly have been common before the eighteenth century, hence its effect upon human customs, industries and mode of life could not have begun to operate appreciably before that time, and it is with this far-reaching effect upon race evolution that we are now concerned, rather than with the question of when the first European cobbler may have put glass into the window of his shop or home.

Without some of these facts we might easily fall into the error, which is doubtless very prevalent to-day, that our ancestors had had glass windows a much greater proportion of the time elapsing since the invention of glass so many centuries ago. But the great change in home life and the change in industrial life and in the industries themselves could not begin until an abundance of cheap glass filled all homes with a flood of daylight, and all shops and offices and factories as well, keeping in the artificial heat at the same time. From that time the outdoor life rapidly lost its people while the world of indoors gained devotees, willing or unwilling, by thousands of thousands. A host of new industries sprang into being in the wake of window glass, and these begat other industries, scientific inventions and discoveries with magic rapidity. The general use of window glass is a thing of yesterday, and in its train there now follows a striking pageant of industrial revolutions. Large factories were made possible, big business began and the physical conditions of home life were completely changed. The air which all breathed, in home and shop and office, became at once far less pure, its oxygen was consumed and it became flecked with fine dust, and the pristine rigors of a temperate climate, with all that they had meant for the vigor of the northern peoples, were commuted to conditions of tropical evenness of temperature with what debilitation such brings and without the constant renewal of air which might be had in the tropics. Although this change came but yesterday, already a marked increase in physical debility in our most "civilized" populations

is a matter of common comment and concern. How quickly our young men in army and navy camps respond to a more rigorous life, with much training in the open under all conditions of temperature and weather. We can fairly see the color and strength and sturdiness return to the youth of a civilization whose vital strength is ebbing while its inventions and industries fairly leap into being.

Before the days of universal window glass what conditions prevailed? There was not the same field for people in the industrial life that there is to-day, while the very lack of combination and cooperation in commerce and industry made it necessary for a far larger proportion of the population to raise their own food in part, thus the indoor life was not available and the outdoor life was a necessity to a larger extent than to-day for the majority of the people.

With window glass the habits of life and livelihood are completely changed, habits of thought are revolutionized and the field and scope of thought changed. The whole environment is changed for the species, including temperature, humidity, material environment, composition of air breathed, visual and mental horizons, and a change in the relative adjustments of human beings to disease germs. Such radical changes both within and without the human organism are bound to produce physiological changes in the individuals. They also set in motion new factors in the evolution of the race. Whether we accept the results of experiments like those, for instance, of Kammerer, the Viennese, upon the effects of climatic change upon the germ plasm of animals and their offspring, or whether we reject them as inconclusive, it is certain that climate and other environmental factors always do in the long run change the character of the inhabitants very radically in one way and another, although just how and in what ways may long remain a subject of dispute.

With window glass industry in shop or office can go on without a break caused by the weather, and what is of still greater consequence, without the long winter hiatus during which bright thoughts could be forgotten and the best of intentions could fade away. Most of our industries of to-day depend upon steady continuity for their existence, and without a guarantee of continuity it would be folly to start many of them. If bad days in summer could stop them and the long cold of winter interrupt them, few of them could be run profitably at all and none of them attain to anything comparable to their modern magnitude.

With window glass man leaves his outdoor or semi-outdoor

activity and becomes a modern industrial worker or office server. With a sturdy foundation of outdoor health behind him he may not notice ill effects of degenerating muscles or dust-clogged respiratory tracts, and he may pass on to his offspring for two or three generations a vigorous heredity. This sturdy heredity came from thousands of generations, literally millions of years of outdoor life of the most strenuous sort. From time immemorial man had lived the kind of life which developed strength and hardiness, on the one hand, while, on the other, it weeded out weakness. The heritage of the ages is not lost over night, yet already we note inroads into the health and vigor of the people. Industries indeed evolved prodigiously, but "advance in civilization" is not necessarily human evolution.

How then is window glass a prime factor in human evolution? First, it changes man's environment and changes his field of thought. Secondly, it alters the temperature and humidity of his environment. Thirdly, it gives him air of a different quality and composition to breathe. Fourthly, it compels him to inhale fine dust constantly. Fifthly, it removes out-door activity from all women and most men in "up-to-date" communities. Sixthly, the germ content of the air in confined buildings is greater than normal, especially so in times when colds and other infectious diseases abound. The more frequent illnesses result in impaired health and reduced vigor. The inferior air also reduces vitality. The inhaled dust clogs minute bronchioles and alveoli of the lungs, causing thousands of cells to toil constantly to ingest foreign and insoluble particles. The muscular degeneration consequent to the changed manner of life will make its permanent change in the race of to-morrow; so will the reduced vitality resulting from the causes just mentioned. So also will the complete artificiality of thought and surroundings. The man of the future will be just as surely altered by these things as is the parasite altered by the environment in which it lives. Whether by direct and cumulative effect upon the organism, or whether by indirect selective agencies of one sort or another, environment in time makes all things new. Great care should be given to the kind of life we lead, and to the kind of factors which we allow our new discoveries and our new "civilization" to load upon us, lest we become the slaves and dupes of our enlightenment, even as the parasitic worm is the dupe of his unfortunate host. Great care should be given to the subject of window glass, that we may see to it that we reap the blessings it brings with it and avoid the bane.